

A Joint NASA and DoD Deployable Optics Space Experiment

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Abstract:

Future NASA and DoD space missions will require high precision large optical telescopes in space. Given size and weight constraints, as well as cost considerations these structures will need to be lightweight and deployable. The deployment and phasing of large deployable optical systems presents numerous technical challenges and currently presents high risk to future systems. One of these challenges includes predicting on-orbit optical performance from ground validated models. The *Interferometry Program EXperiment* (IPEX) which monitored the on-orbit dynamics of a free-flying 9-bay articulated truss, demonstrated significant behavior changes from a 1-g to a 0-g environment [1].

The DoD is forming a partnership with NASA on NEXUS, a deployable optic flight demonstrator scheduled to launch in 2003. NEXUS is designed to demonstrate technologies for NGST, primarily the deployment and wave front control of a 2.8 meter optical telescope in space. The platform will be extensively instrumented to provide the DoD and NASA valuable and relevant information on the performance hindering effects of micro- and nano-dynamics. The NEXUS technology demonstrator will enable the DoD and NASA to answer critical questions and enable model validation on the effects of micro-dynamics and nano-strains on 0-g system performance, effects that are not readily or easily determined from ground testing. NEXUS will also provide a validation for the process used to set mechanical requirements, and to perform the appropriate suite of ground tests and analyses at the component and system level for accurate on-orbit optical performance prediction. This paper will provide an overview of the NEXUS flight experiment, traceability to NASA and DoD deployed optics requirements, and the technical reasons for performing this joint flight experiment.

[1] M. Levine and M. Ingham, "IPEX-2 Flight Data Analysis: Quiescent Period Report", JPL D-17912, NASA Jet Propulsion Laboratory, Pasadena CA, June 30, 1999.